REMARKS

The Office Action dated July 12, 2002 has been carefully considered and this Reply prepared in response. Applicant respectfully requests reconsideration of the present application in view of the foregoing amendments and the following remarks.

After amending the claims as set forth above, claims 1-10, 12, and 14-26 are now pending in this application; of these, claims 1-9, 16, 19-22 and 26 are non-elected.

In the Office Action, claims 10, 13-15, 17, 18 and 25 were rejected under 35 U.S.C. § 102(b) as being unpatentable over either of U.S. Patent Nos. 5,602,888 to Hettiarachchi or 5,793,830 to Kim et al, claims 10, 13-15, 18 and 25 were rejected under 35 U.S.C. § 102(b) as being unpatentable over either of U.S. Patent Nos. 5,608,766 to Andresen et al. or 5,768,766 also to Andresen et al., claims 12, 23 and 24 were rejected under 35 U.S.C. § 103(a) as being unpatentable over either of Hettiarachchi or Kim in view of either of U.S. Patent Nos. 5,377,245 to Uetake or 4,842,812 to Panson et al. and claims 12, 34 and 24 were rejected under 35 U.S.C. § 103(a) as being unpatentable over either of the Andresen references in view of either of Uetake or Panson.

Claim 10 As Amended Claims a Method Step Not Disclosed In Any Of The References

In order to facilitate early allowance of this application, Claim 10 has been amended to clarify that the corrosion potential reducing substance is comprised of particles made of TiO_2 that are coated with one or more of the noble metals Pt, Rh, Ru and Pd. As explained in the specification, TiO_2 is one of a number of identified compounds that produce a photocatalytic reaction when exposed to ultraviolet light, X-ray, gamma, or particular radiation. TiO_2 is also recited in claim 13, now cancelled. Applicant believes that corrosion potential reducing substances comprising particle cores of the other disclosed photocatalytic materials as well as materials capable of forming photocatalytic materials under nuclear reactor operating conditions coated with the noble metals Pt, Rh, Ru and Pd are allowable over the references cited in the Office Action. Accordingly, Applicant specifically reserves the right to pursue in subsequent continuations the subject matter deleted by the amendment to claim 10.

None of the cited references disclose applying to a reactor structural material a corrosion potential reducing substance comprising particles of TiO_2, a photocatalytic substance, coated with a noble metal (e.g., Pt). Rather, the references merely disclose applying solid layers of noble metals, sometimes in combination with a solid oxide layer. None of the reference disclose applying a multi-component particulate form material, and none disclose applying a multi-component corrosion potential reducing substance where one of the components is photocatalytic in response to radiation present in nuclear reactors.

Specifically, Hettiarachchi discloses that a noble metal is injected into reactor water in order to reduce corrosion potential of reactor components (column 7, last paragraph and column 8, lines 1 to 3). Moreover, Hettiarachchi describes on column 4, lines 31 to 33 "The oxide film is believed to include mixed nickel, iron and chromium oxides." Hettiarachchi fails to mention or suggest injecting (1) noble metal as particles, (2) particles made of TiO_2 coated with a noble metal, or (3) coating the noble metal on a photocatalytic substrate. None of the cited references overcome these deficiencies.

Likewise, Kim discloses in Fig. 9E, etc., forming an insulating layer of a metal, such as Zr, on the structural material and then forming a passivating layer, such as ZrO_2. However, Kim does not disclose or suggest a coating of <u>particles</u> made of TiO_2, serving as a photocatalytic substance, coated with a noble metal. Further, Kim discloses placing the oxide (or nitride, etc.) layer on the <u>outside</u> (i.e., in contact with the reactor coolant) versus inside a layer of noble material as recited in Claim 10. Also, Kim teaches two steps of first applying a metal layer and then forming an oxide film on the metal layer, a method very different from that recited in Claim 10. Finally, Kim is silent about any use of a photocatalytic nature of ZrO_2 to reduce corrosion potential.

Similarly, Andresen-1 ('766) and Andresen-2 ('330) disclose laying down an oxide film containing iron and a noble metal (e.g., palladium). Again, these references do not disclose applying a particle-based corrosion inhibiting material, a corrosion inhibiting material of particles made of TiO2 centers coated with a noble metal, nor use of an oxide that possesses photocatalytic properties in the presence of radiation present in a nuclear reactor in combination with a noble metal.

Finally, neither Uctake et nor Panson disclose or suggest a combination of TiO_2 as a photocatalytic substance with a noble metal coating sufficient to overcome the deficiencies in the other references.

The allowability of Claim 10 over the cited references is further demonstrated by the operational advantages the claimed method provides over the methods disclosed in the references. Using the present invention, the corrosion potential of the reactor structural member can be reduced without injecting hydrogen into the reactor water or by injecting only small amounts of hydrogen into the reactor water. The noble metal (e.g., Pt) on the outside of the particles enhances the corrosion potential reducing effect of the photocatalytic substance. This reduces the amount of ammonia formed in the reactor with N-16, thus reducing radiation levels in the turbine system due to migration of volatile ammonia. In turn, this can reduce the need for expensive recombiners and off-gassing systems. Further, since only a very small amount of the noble metal is necessary, the oxidation and hydrogenation of the fuel material are not substantially promoted as happens when the Hettiarachchi or Kim methods are employed.

In sum, Claim 10 as amended recites a method that is completely different from any method or any combination of the methods disclosed in the cited references. For this reason, Applicant respectfully believes that Claim 10 is allowable over the cited references under both 35 U.S.C. §§ 102 and 103. Accordingly, Applicant respectfully requests withdrawal of the rejections of Claim 10.

Claims 12, 15, 17, 18 and 25 Are Amended For Reasons Other Than Allowability

Claims 12, 15, 17, 18 and 25 are amended in order to place them in proper format. Applicant does not intend to limit the scope of the claims by these amendments, and does not make these amendments in order to overcome a rejection. Accordingly, Applicant believes these amendments do not create the basis for prosecution history estoppel.

Remaining Claims Are Allowable For Depending From An Allowable Claim

Claims 12, 14, 15, 17, 18 and 23-25 all depend, either directly or indirectly, from Claim 10 which Applicant submits is in condition for allowance. Accordingly,

Applicant respectfully requests withdrawal of the rejections of Claims 12, 14, 15, 17, 18 and 23-25. This paragraph responds to paragraphs 4 – 7 of the Office Action.

Likewise, Applicant submits that the non-elected claims that depend from Claim 10 are also in condition for allowance. Accordingly, Applicant respectfully requests allowance of pending claims 16 and 19-22 which all depend from Claim 10.

Claim 10 As Amended Addresses Item 2 of the Office Action

The Examiner mentions in the last sentence of Item 2 of the Office Action: "Contrary to the allegation of the applicant in said amendment, the claim language does not state that the noble metal is applied on a surface of the reactor structural member." Applicant respectfully points out that Claim 10, as now amended, recites applying the TiO_2 – noble metal particulate film "on a surface of the reactor structural member" and recites that the noble material is provided on the surface of the particles. Thus, the noble metal is both in contact with the surface of the structural member and with the reactor coolant when the corrosion potential reducing substance has been applied.

Conclusion

Applicant believes that the present application is now in condition for allowance. Favorable reconsideration of the application as amended is respectfully requested. The Examiner is invited to contact the undersigned by telephone if it is felt that a telephone interview would advance the prosecution of the present application.

Respectfully submitted,

Date November 12, 2002

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MARKED UP VERSION SHOWING CHANGES MADE

Below are the marked up amended claim(s):

10. (Twice Amended) A method of suppressing [a] corrosion of a reactor structural member, comprising:

controlling a corrosion potential of the reactor structural member by providing a corrosion potential reducing substance on a surface of the reactor structural member, the corrosion potential reducing substance [being selected from the group consisting of a photocatalytic substance which produces an electromotive force under an irradiation of a light or a radioactive ray in the nuclear reactor and a metal or a metal compound which forms the photocatalytic substance under a condition specified by a temperature and a pressure in the nuclear reactor, the corrosion potential reducing substance] being formed as [a] particles made of TiO_2, each particle having a surface on which at least one of Pt, Rh, Ru and Pd is provided.

12. (Amended) The method according to claim 10, [wherein] further comprising controlling an iron concentration of a feedwater in the nuclear reactor [is controlled].

15. (Amended) The method according to claim 10, [wherein] further comprising adding a solution or a suspension of a composition containing [the] a photocatalytic substance [is added] to a reactor water so as to make the photocatalytic substance adhere to the surface of the reactor structural member or to form a film of the photocatalytic substance on the surface of the reactor structural member.

17. (Amended) The method according to claim 10, wherein the corrosion potential reducing substance is formed on the surface of the reactor structural member as a film having a thickness in a range of 0.1 to 1 μm.

18. (Amended) The method according to claim 10, wherein the reactor structural member is made of an iron-base or nickel-base alloy, and the corrosion potential reducing substance is formed on a corrosion oxide film formed on the surface of the reactor structural member.

25. (Amended) The method according to claim 10, [wherein] <u>further comprising injecting</u> [a] hydrogen or [a] methanol [is injected] through a feedwater system of the nuclear reactor into a reactor water.